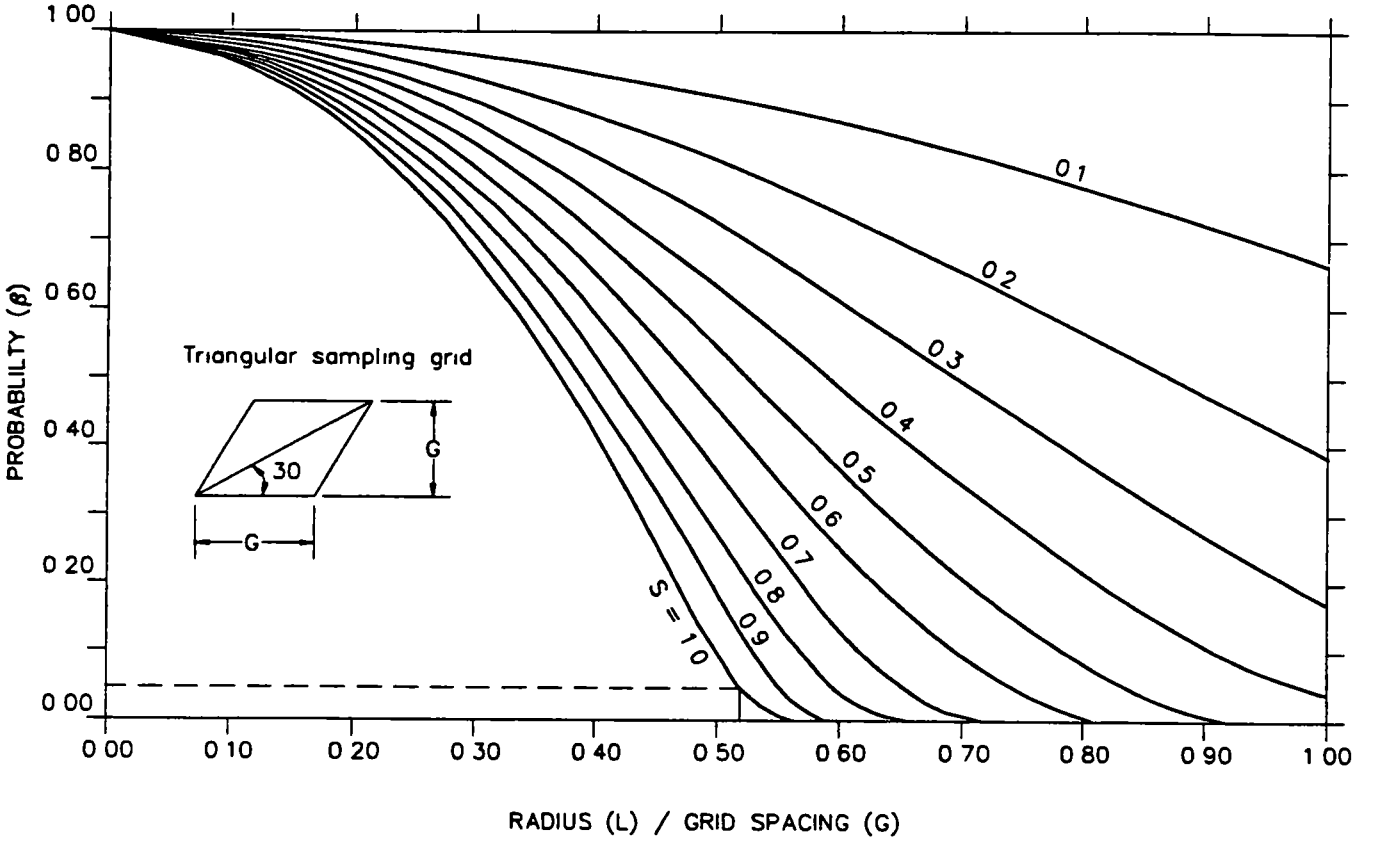
Figure 4-1 Curves Relating L/G to Probability (β) for Different Target Shapes using a Triangular Grid Pattern



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5 RI TASKS

The tasks necessary to implement the RI technical approach include project planning field investigation sampling IDW management, sample tracking and data analysis data management and validation and data evaluation

The final tasks to fulfill RI requirements are a site specific screening human risk assessment (HRA) screening ecological risk assessment (ERA) and preparation of the RI Report

5 1 PROJECT PLANNING

Project planning is the first step toward ensuring the RI field investigation data evaluation and risk assessments proceed in a logical environmentally sound and cost effective manner Project planning will entail the following subtasks

Conduct project set up and planning/kick off meeting

- Acquire additional information (utility maps etc) and prepare technical statements of work
- Coordinate with subcontractors
- Prepare site visit form/health and safety certification tables

Coordinate sample and shipping logistics

Obtain site access and conduct pre work meeting

5 2 FIELD INVESTIGATIONS

Field investigation tasks are required to characterize impacts to the Site and to evaluate the potential risks to human health and/or the environment posed by chemical contaminants Task management and quality control review of all field activities will be provided The activities associated with each phase of the field investigation are described in the FSP portion of the SAP (Earth Tech 1998b)

5 2 1 Mobilization and Health and Safety Kick Off Briefing/Meeting

Mobilization will entail the following subtasks

- Mobilize field equipment and field supplies to an onsite storage area
- Mobilize three personnel from Hawaii to Guam

Review the site specific HSP with all field and subcontractor personnel on the first day of field activities Special attention will be paid to emergency procedures

5 2 2 Site Preparation/Passive Soil Gas Survey

The field crew will prepare an area for temporary secure storage (e g field trailer) and areas for field work (e g decontamination pit, IDW staging area) based on locations selected during the pre work meeting and will mark the proposed locations of the utility survey and field sampling

To characterize the distribution of potential surface and subsurface soil at the Site systematic soil gas sampling will be conducted along a triangular grid sampling system including the wedge shaped section on the northeast corner The soil gas sample results will be evaluated in conjunction with

surface soil sample analytical data and geophysical survey results to conduct an overall screening of these areas Approximately 134 soil gas samples and duplicates will be collected Soil gas probes will remain in the ground for approximately 2 weeks and subsequently be analyzed for VOCs and SVOCs

5 2 3 Vegetation Clearing

Vegetation will be cleared to access the trench sampling locations by personnel and excavation equipment Only the minimum amount necessary to gain access to the sampling locations will be cleared To the extent possible wetland areas will be avoided Because the amount of cleared vegetation is anticipated to be minimal it is assumed the vegetation will be left on the Site If necessary cleared vegetation will be removed from the Site and disposed of in the Navy PWC Landfill

5 2 4 Utility Survey

Available utility plans will be reviewed in conjunction with a visual inspection of the proposed sampling locations to make a preliminary identification of utilities underlying the Site Prior to the start of intrusive field work a geophysical survey will be conducted at each proposed subsurface sampling location not previously surveyed The purpose of the survey is to clear sampling locations for safe access

5 2 5 Surface Soil Sampling/Trenching and Subsurface Soil Sampling

During the field investigation soils less than 6 inches bgs will be sampled to characterize surface and near surface soil contamination Twenty one surface soil samples will be collected using a grid similar to the soil gas survey One surface soil sample will be collected from each accessible (unobstructed uncovered) location as close as possible to the grid point

Subsurface soil samples will be collected between 5 and 10 feet bgs at the same location as the surface soil samples Twenty one trenches will be excavated to collect subsurface soil samples and characterize subsurface lithologic conditions Based on visual observations and field screening one of the two samples from each trench will be sent to the laboratory for chemical analysis

5 2 6 Sample Point/Topographic Surveying

Horizontal coordinates and vertical elevations will be established for all surface soil sampling and trench locations by a Guam registered land surveyor The survey will be conducted in accordance with National Oceanic and Atmospheric Administration (NOAA) standards using horizontal and vertical accuracy of ±0 1 feet and a benchmark elevation accuracy of ±0 01 feet

5 2 7 Investigation Derived Waste and Government Property

Investigation derived wastes generated during the field work are anticipated to consist of soil cuttings decontamination water and discarded solid waste including personnel protective equipment (PPE) disposable sampling equipment, and Visqueen IDW management is detailed in Section 6 of the FSP

All GP used will be signed out in accordance with the government property control system New equipment purchased if necessary will be logged into the system All nonconsumable equipment will be inventoried cleaned organized, and returned to the government All consumable equipment will also be inventoried

5 2 8 Demobilization

Upon completing field investigation activities all unused supplies and government property (GP) will be re inventoried unused supplies and GP will be stored or transmitted as appropriate and the contractor and all subcontractors will demobilize from the Site (i e the Site will be cleared of investigation debris)

5 3 LABORATORY ANALYSIS

Soil gas samples will be analyzed for VOCs and SVOCs Surface soil samples and trench soil samples will be analyzed for TPH VOCs SVOCs chlorinated pesticides and PCBs explosive residues and TAL metals Ten soil samples 3 surface and 7 subsurface will be tested for geotechnical parameters moisture content, density particle size distribution porosity and permeability The methods to be used for chemical analysis of the soil samples are as follows

TPH EPA Method 8015B

- VOCs CLP OLM Method 3 1
- SVOCs CLP OLM Method 3 1

Pesticides/PCBs CLP OLM Method 3 1

Explosive residues SW 846 EPA Method 8330

TAL metals CLP ILM Method 4 1

For soil gas analysis the methods are as follows

VOCs SW 846 EPA Method 8021

SVOCs SW 846 EPA Method 8270B

5 4 DATA MANAGEMENT AND VALIDATION

All sample analytical data will be entered into a relational database using electronic versions of the data obtained directly from the analytical laboratory Data will be stored organized sorted and queried using the database and will also be downloaded to spreadsheets to perform summary statistics and the screening risk assessments (see the Appendix to the WP)

Data validation will be performed on chemical analytical data following SOPs II A through II O (DON 1996) These procedures are designed to fulfill the PACNAVFACENGCOM Level C and Level D Quality Control (QC) data validation requirements Data to be validated include sample handling and management items such as holding times shipping temperature integrity of sample containers chain of custody surrogate recoveries laboratory contamination matrix spike and duplicate laboratory precision and accuracy calibration and tuning information other laboratory QC data field duplicate precision and accuracy and field QC samples Data validation results will be presented in the RI Report, along with statements about whether data must be qualified Data will be appropriately flagged

The Form I data sheets for chemical data will be validated Accompanying raw data (e g chromatography) will be validated for samples expected to be critical for the risk assessments samples showing unexpected concentrations or detection of particular analytes or samples for

which Form I data validation indicates problems If problems are encountered with the selected portion of raw data that are validated then a larger portion of the raw data may be validated

5 5 Data Evaluation

Upon completing all data collection and data validation chemical analytical data will be evaluated in the following manner

Evaluate soil gas surface soil and subsurface soil data to assess the nature and extent of impacts (if any)

Compare chemical analytical data to applicable ARARs TBCs and risk assessment–derived thresholds and

Preliminarily assess further required response actions

5 6 Assessment of Risk

A preliminary risk evaluation (PRE) will be conducted if contamination has been detected A risk assessor will assess the potential risk posed by materials dumped at the Site to human health and the environment The findings of the PRE will serve as a basis for determining if further action at the Site is warranted Details on conducting the risk assessment are provided in the Appendix to this WP

5 7 RI Report Preparation

Preparation of the RI report will follow completion of all field activities receipt of analytical data from the laboratory completion of data validation procedures and performance of a HRA and ERA The report will document all project activities present all data collected discuss data evaluation and interpretation and discuss the HRA and ERA results The proposed schedule for all RI tasks including report preparation is provided in Section 6

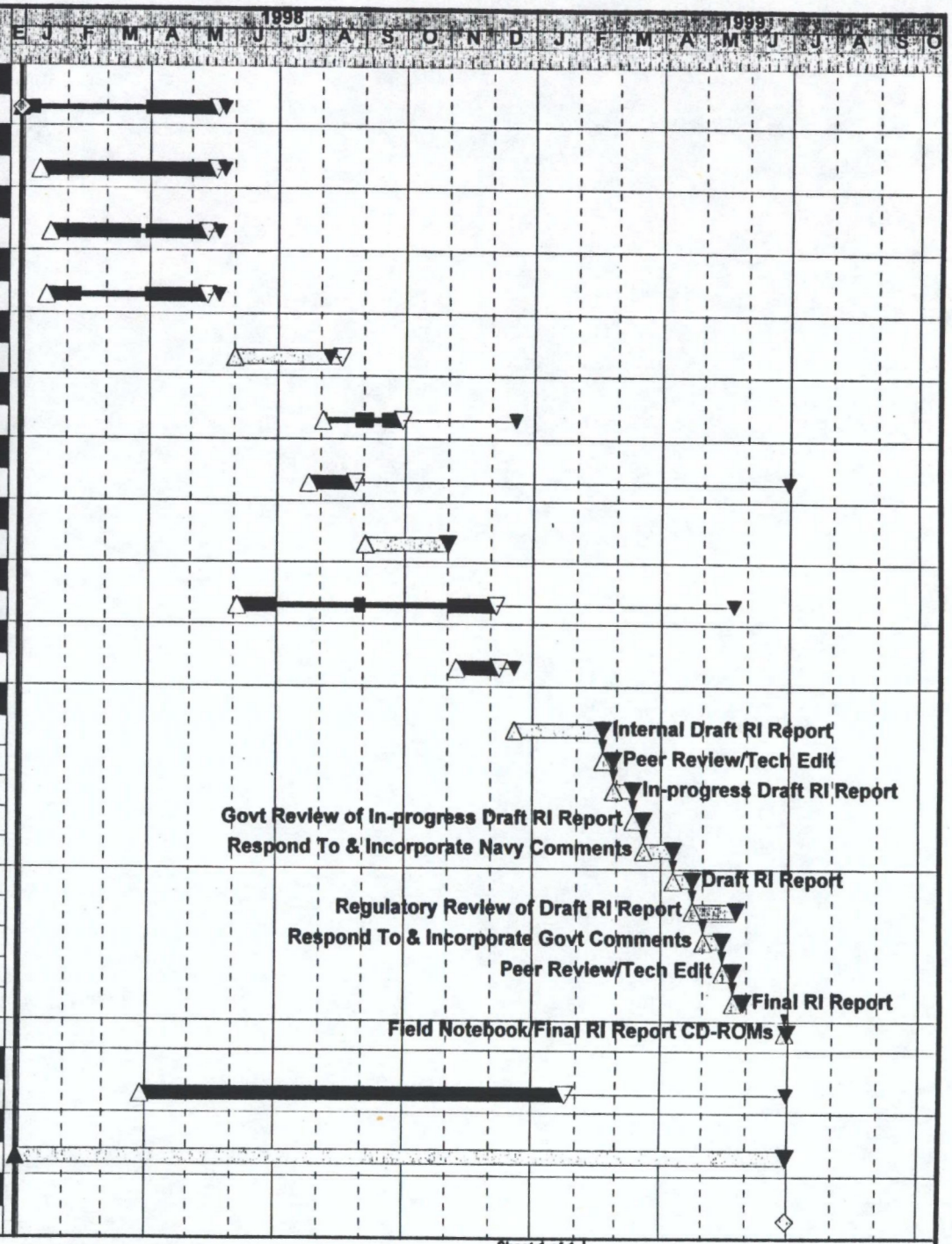
6 SCHEDULE

The RI will be implemented over approximately 16 months (Figure 6 1) The attached schedule is for planning purposes only it will be adjusted to reflect changes This scheduled is based on the milestones and durations shown in Table 6 1

Table 6-1 Project Milestones

Task	Date
Field Work	Start 10 days after submittal of Final Planning Documents duration 84 days
Preliminary Report	Due 118 days after completion of field work
Draft Report	Due 28 days after receipt of review comments (Assume a 7-day Navy review period of the Preliminary Report)
Final Report	Due 28 days after receipt of review comments (Assume a 30-day Navy review period of the Draft Report)

Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
+ Project Planning				
		0		18MAY98
+ Work Plan (WP)				
		126	12JAN98	17MAY98
+ Sampling & Analysis Plan (SAP)				
		112	20JAN98	11MAY98
+ Health & Safety Plan (HSP)				
		115	17JAN98	11MAY98
+ Field Investigation				
		76	01JUN98	15AUG98
+ IDW Sampling, Evaluation, Disposal				
		56	03AUG98	27SEP98
+ Chemical Laboratory Analysis & Oversight				
		33	24JUL98	25AUG98
+ Data Validation				
		59	02SEP98	30OCT98
+ Data Evaluation				
		185	03JUN98	04DEC98
+ Risk Assessment				
		30	07NOV98	06DEC98
Report Preparation				
60.010	Internal Draft RI Report	63	19DEC98	19FEB99
60.020	Peer Review/Tech Edit	7	20FEB99	26FEB99
60.030	In-progress Draft RI Report	14	27FEB99	12MAR99
60.031	Govt Review of In-progress Draft RI Report	7	13MAR99	19MAR99
60.040	Respond To & Incorporate Navy Comments	21	20MAR99	09APR99
60.050	Draft RI Report	14	10APR99	23APR99
60.051	Regulatory Review of Draft RI Report	30	24APR99	23MAY99
60.060	Respond To & Incorporate Govt Comments	14	01MAY99	14MAY99
60.070	Peer Review/Tech Edit	7	15MAY99	21MAY99
60.080	Final RI Report	7	22MAY99	28MAY99
60.090	Field Notebook/Final RI Report CD-ROMs	1	28JUN99	28JUN99
+ Purchasing/Subcontracts Administration				
		303	28MAR98	24JAN99
+ Project Management				
		547*	29DEC97A	28JUN99
+				
		0		28JUN99



Project Start	29DEC97
Project Finish	28JUN99
Data Date	29DEC97
Run Date	30MAR98

Early Bar
Float Bar
Progress Bar
Critical Activity

CT30

Sheet 1 of 1

Project Schedule
New Arpa Heights Disposal Area
COMNAVMARIANAS, Guam

7 REFERENCES

Department of the Navy (DON) 1996 *Project Procedures Manual U S Navy PACNAVFACENG COM Installation Restoration Program* PACNAVFACENGCOM September

Earth Tech Inc 1997 *Geophysical Investigation New Apra Heights Disposal Area Naval Activities Guam* November

——— 1998a Technical Memorandum Biological Reconnaissance and Wetland Delineation New Apra Heights Disposal Area, Guam January

——— 1998b *Draft Sampling and Analysis Plan Abbreviated Remedial Investigation New Apra Heights Disposal Area COMNAVMARIANAS Guam* April

Gilbert R O 1987 *Statistical Methods for Environmental Pollution Monitoring* Van Nostrand Reinhold Inc

Government of Guam 1996 *Reuse Plan for GLUP 94 Navy Properties* October

Ogden Environmental and Energy Services Co Inc (Ogden) 1995 *Southern High School Site Investigation Report (SI) Santa Rita Guam* May

——— 1996a *Base Realignment and Closure (BRAC) Cleanup Plan for FISC NAVACTS PWC Guam Sites* October

——— 1996b *Environmental Baseline Survey Final for Naval Activities Various Sites Volume I Guam Mariana Islands* November

Pacific Basin Environmental Consultants Inc (PBEC) 1993 *Environmental Impact Assessment for the Southern High School Complex Santa Rita Guam* February

United States Department of Agriculture Soil Conservation Service (USDA) 1988 *Soil Survey of the Territory of Guam* May

United States Environmental Protection Agency (USEPA) 1997 *Region IX Preliminary Remediation Goals*

APPENDIX
RISK ASSESSMENT

CONTENTS

1 HUMAN HEALTH PRELIMINARY RISK EVALUATION

The human health PRE will be performed to assess whether the Site poses a significant risk to human health This section describes the methodology used in performing the PRE The PRE will be conducted according to the *USEPA Risk Assessment Guidance for Superfund (RAGS)* (USEPA 1989 and 1991a) To conserve resources the PRE will be conducted in two phases first, a conservative screening PRE using the USEPA Region IX PRGs (USEPA 1996a) as the basis of comparison then if necessary a site specific PRE

On the basis of USEPA Region IX recommendations (Stralka 1995) the initial screening PRE will be performed when (1) the complete or potentially complete exposure pathways of concern at the Site are the same as those used in the development of the USEPA Region IX PRG Table (USEPA 1996a) and (2) pathway specific exposure parameters are expected to be similar to the USEPA assumptions used for PRG calculations Because Site conditions indicate that complete or potentially complete exposure pathways are the same as those addressed in the PRG table a screening PRE will be performed Additionally if the conservative screening PRE results indicate potentially significant health risks a site specific human health PRE will be performed to derive more realistic Site specific levels of risk

1 1 General Methodology for Conducting a Screening PRE

The following steps are involved in performing a screening PRE

Development of a CEM

Identification of relevant data sets

Estimation of exposure point concentrations

Calculation of screening cumulative health risks

Evaluation of health effects posed by lead

Evaluation of the screening PRE results

1 1 1 Development of a Conceptual Evaluation Model

A CEM describes the interrelationships between the receptors exposure points transport pathways and contaminant sources at a site The preliminary CEM presented in Section 3 of the WP will be refined as necessary based upon the findings of the RI Pertinent information to be searched and presented are land uses potentially exposed populations and potentially complete exposure pathways In accordance with USEPA (1989) human health PREs are intended to address only contaminants for which there is a complete or potentially complete exposure pathway under current and future land use conditions RAGS (USEPA 1989) defines a complete or potentially complete exposure pathway as one that consists of the following four elements (1) a source and mechanism of chemical release (2) a retention or transport mechanism through an environmental medium (3) a point of potential human contact with the contaminated medium (exposure point) and (4) an exposure route at the exposure point As previously discussed for USEPA Region IX PRGs to be relevant in the screening PRE complete or potentially complete exposure pathways of concern and pathway specific exposure parameters for the site are assumed to be similar to those used in PRG calculations (USEPA 1996a)

Currently the Site is owned by the U S Navy and is undeveloped Surrounding land uses include

the SHS located southeast and upgradient from the Site

the Navy operated elementary and intermediate school in Building 4175 to the northwest of the site

the New Apra Heights housing to the north

the Santa Rita housing development located southwest and down gradient from the Site

The Site slopes generally from east to west Past disposal appears to have occurred in the northeastern half of the Site

Potential human receptors include current trespassers who are most probably nearby residents The Site will be transferred out of Navy control under the BRAC Act Future development of the Site will be industrial according to GLUP 1994 (GOVGUAM 1996) Potential future human receptors include industrial workers and trespassers The exposure pathways could include incidental ingestion of soil dermal soil contact, and inhalation of particulates and VOCs by current trespassers and future workers

The shallow water bearing zone is not used for domestic purposes All existing housing near the disposal area is provided with municipal water and sewer service Therefore there is no current, and probably no future exposure to contaminated groundwater

1 1 2 Identification of Relevant Data Sets

Before performing a screening PRE the analytical data will be reviewed to identify the appropriate impacted area(s) of concern and to develop a three dimensional understanding of contaminant distributions If environmental samples are analyzed for a chemical using more than one analytical method the most reliable results (as indicated by data validation qualifiers or laboratory data qualifiers) that provide representative environmental concentrations will be selected To conservatively protect human health the screening PRE will focus on data from the impacted area(s) within the Site TPH, which is not regulated under CERCLA and contaminants without USEPA Region IX PRGs will not be included in the screening PRE TCL metals detected at background levels field or laboratory contaminants and essential nutrients evaluated in the screening PRE will be noted

1 1 3 Estimation of Exposure Point Concentrations

USEPA defines exposure point concentrations as the representative chemical concentrations that a receptor may contact at a location during the exposure period (USEPA 1989) Exposure point concentrations may be estimated using direct measurement data (i e soil concentrations from the sampling and analytical programs) or a combination of direct measurement data and the results of fate and transport modeling

Based on USEPA Region IX recommendations (Stralka 1995) maximum and reasonable maximum exposure (RME) risk calculations will be performed as part of the screening PRE For the maximum risk calculation, USEPA Region IX PRGs and maximum detected concentrations will be used to identify health risks related to the most impacted areas The RME is defined as the maximum exposure that is reasonably expected to occur at a site The RME risk calculation

is based on USEPA Region IX PRGs and RME exposure point concentrations and it estimates the health risks associated with the high end of the population distribution

Estimating RME exposure point concentrations for use in a screening PRE requires an understanding of the data distribution Chemical concentrations in environmental media shall be assumed to be log normally distributed (Gilbert, 1987 USEPA 1992) The RME exposure point concentration is defined by USEPA as the lesser of either the 95th UCL of the arithmetic mean or the maximum detected value

All acceptable data will be included in the statistical analysis to estimate the RME exposure point concentrations For compounds detected at least once in the media of concern non detected values will be computed as concentrations equaling one half the detection limit (USEPA 1989) Detection limits greater than two times the maximum detected values will be eliminated from the statistical analysis to avoid using unrealistically high detection limits for non detected values (USEPA 1989)

1 1 4 Calculation of Screening Cumulative Health Risks

According to USEPA (1991a) health based PRGs are chemical concentrations which if exceeded in environmental media, represent a potential risk to human health PRGs are intended by USEPA to be used as initial guidelines to facilitate development of a range of appropriate remedial alternatives and to focus selection on the most effective remedy PRGs do not establish that cleanup is warranted to meet these goals PRGs estimate containment levels in environmental media which correspond to a lifetime excess cancer risk (above background) of one in a million (1E-06) and/or hazard index (HI) of 1 for non cancer concerns

By definition PRGs for soil represent the soil concentrations below which no significant adverse health effects are likely to occur from the assumed direct contact pathways (soil ingestion dermal contact with soil and inhalation of particulates and VOCs from soil) Consequently a soil PRG derived by the USEPA Region IX is best applied only to surface soils A soil PRG applied to subsurface soils may be overly conservative for semivolatile immobile or insoluble contamination in the unsaturated zone where direct human contact is unlikely or less health protective for certain mobile organic species that may leach to underlying groundwater which is used as a drinking water source Also the USEPA Region IX VOC emission model is based on a contaminated area of 2 025 square meters and the fugitive dust model assumes a continuous and constant source of emissions If the source at the Site is small and likely to deplete during the exposure timeframe then USPEA Region IX PRGs overestimate risk (California EPA [Cal EPA] 1994)

PRGs (USEPA 1996a) listed for some VOCs in soils may not be totally health based For example when the estimated health based PRGs exceeded the estimated saturated levels for VOCs in soils (C_{sat}) the lower C_{sat} levels were selected as the listed PRGs in the hardcopy PRG Table Also when the estimated health based PRGs for SVOCs and inorganics exceeded 100 000 mg/kg a cutoff level of 100 000 mg/kg was selected in the hardcopy PRG Table The lower PRGs are used for evaluation

USEPA Region IX PRGs for tap water were derived based on the assumption that the water would be used for domestic purposes (drinking bathing, etc) Thus tap water PRGs should only be applied to potable or potentially potable water

Because PRGs are based on a target lifetime excess cancer risk of 1E 06 or an HI of 1 some PRGs particularly those based on cancer risk are less than the currently achievable medium specific and chemical specific practical quantitation limit (e g bis(2 ethylhexyl)phthalate) or less than the typical background levels in the environment (e g arsenic and beryllium)

Assuming that the effects posed by different contaminants are additive (i e not influenced by synergistic or antagonistic interactions) and that chemical concentrations and other exposure parameters remain constant throughout the exposure period (USEPA 1989) the cumulative excess cancer risk or noncarcinogenic HI is conservatively calculated by dividing the concentration term (maximum or RME) by its respective carcinogenic or noncarcinogenic PRG and multiplied by the target risks used to derive the PRGs (an excess cancer risk of 1E 06 or an HI of 1)

It should be noted that HIs are not statistical probabilities such as excess cancer risks and the level of concern does not increase linearly as the HI increases For regulatory purposes an HI of 1 or less is considered an acceptable noncarcinogenic risk level (USEPA 1989 1990 1991b) If the pathway specific or total exposure HI exceeds 1 segregation of the HI on the basis of the type of effects or mechanisms of action may be considered (USEPA 1989)

1 1 5 Evaluation of Health Effects Posed by Lead

Although the USEPA has derived a noncarcinogenic residential PRG for lead using the Integrated Exposure Uptake Biokinetic Model (IEUBK) (USEPA 1994) an HI for lead will not be determined because there is no discernible safe threshold for human exposure to lead Thus the cumulative HI reported for the screening PRE will not include a quantitative evaluation for lead Using the IEUBK model USEPA Region IX currently proposes a residential PRG for lead of 400 mg/kg based on a child s exposure at an average daily rate of soil ingestion of 100 mg/day (USEPA 1996a)

For adult receptors the current USEPA Region IX industrial PRG of 1 000 mg/kg for lead (USEPA 1996a) is not supported by blood lead modeling results because the IEUBK model only addresses 0 to-6-year old child receptors The Guam Environmental Protection Agency also offers no specific guidance for evaluating exposure of adult receptors to lead

An internal USEPA Region IX memo sent to the Navy on August 8 1996 (USEPA 1996b) announced that a new blood lead model for adults is being implemented at all sites under the jurisdiction of CERCLA This new model is based on the adult blood lead model presented in *Assessing the Relationship Between Environmental Lead Concentrations and Adult Blood Lead Levels* (Bowers *et al* 1994) The model has been published in Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risk Associated with Adult Exposure to Lead in Soil" (USEPA 1996c) Because the Site is being remediated under CERCLA this model should be used for screening purposes

Using default parameters recommended by USEPA Region IX, the model predicts an industrial protective soil concentration of 2 000 mg/kg USEPA Region IX has recommended the use of 2 000 mg/kg as an industrial soil PRG (Stralka 1997)

1 1 6 Evaluation of the Screening PRE Results

If the site has been adequately characterized and medium specific cumulative RME health risks are at or below an excess cancer risk of 1E 06 (point of departure) and an HI of 1 and if there is no adverse ecological impact (Stralka 1995) then no further action will be recommended If the screening cumulative RME excess cancer risk exceeds 1E 06 and/or the HI exceeds 1 then a site specific PRE will be performed as described in Section 5 6 1 2 If maximum and RME exposure point concentrations for lead exceed the appropriate USEPA Region IX PRG then a site specific PRE will be performed

1 2 General Methodology for Conducting a Site Specific PRE

The site specific PRE includes only chemicals selected as COPCs COPCs are defined by the USEPA (1989) as chemicals that are potentially Site related and for which data are of sufficient quality for use in a quantitative risk assessment As recommended by USEPA Region IX toxicologists (Stralka 1995) chemicals with maximum detected concentrations greater than the medium specific PRG will be selected as COPCs Common laboratory contaminants such as acetone aldol products of acetone 2 butanone methylene chloride and phthalates will be eliminated from the COPC list The metals concentrations of COPCs associated with the PRE will be compared to background metal concentrations to determine if the metals concentrations associated with risk are within the background range

The site specific PRE may also adjust screening health risk values for site specific land use and exposure conditions As an example resident children at the Santa Rita housing development may be exposed to contaminated surface soil/sediment which exists at the housing development through drainage of surface water from the Site

When the site specific cumulative RME HI exceeds 1 the HI will be segregated on the basis of the toxic effects and target organs (USEPA 1989) A brief discussion of adverse effects posed by risk driving COPCs will be included

If the site has been adequately characterized the following actions will be taken

If the site specific cumulative RME health risks are below an excess cancer risk of 1E 06 (point of departure) and an HI of 1 and if there is no adverse ecological impact (Stralka 1995) then no further action will be recommended

If the site specific cumulative RME excess cancer risk is between 1E 06 and 1E 4 then the remedial investigation staff and risk assessors will recommend the most cost effective action at the Site The Navy and Risk Managers will decide whether or not to take action on the basis of site specific conditions at the site (USEPA 1991b)

If the site specific cumulative RME health risks slightly exceed an RME excess cancer risk of 1E 04 and a segregated HI of 1 and there are no isolated, impacted areas where a small removal action could adequately reduce the health risks at the Site then the PRE team will recommend a baseline risk assessment in the absence of a response action The cost of conducting a baseline risk assessment would be compared to the cost of any proposed removal or remedial action This evaluation would be based on professional judgment, and would consider factors such as site specific exposure conditions land uses risk driving COPCs (for example Class A carcinogens neurotoxicants or reproductive toxicants) types of critical effects etc

If the site specific cumulative RME risk values are so high above the trigger level for remediation (one order of magnitude or more) that no baseline risk assessment approach can refine the risk estimates to acceptable levels then the Navy may conduct a removal action only if it would cause no unreasonable impacts to the Site ecology (Stralka 1995)

In other cases the Navy may determine that additional data are required to arrive at a more conclusive risk assessment for the Site (i e more pathways need to be evaluated etc)

2 ECOLOGICAL PRE

The ecological PRE will be performed to assess whether the Site is impacted and whether the contamination poses a significant risk to ecological receptors The ecological PRE will be conducted according to the screening level guidance presented in *USEPA Risk Assessment Guidance for Superfund Process for Designing and Conducting Ecological Risk Assessments Interim Final (ERAGS)* (USEPA 1997) All ecological risk assessments are expected to include at least the first two screening steps A full baseline ecological risk assessment is an eight step process and includes the Step 1 and Step 2 screening level approach

Step 1 includes

a Screening Level Problem Formulation

1 Environmental setting and contaminants at the Site
2 Contaminant fate and transport,
3 Ecotoxicity and potential receptors
4 Complete exposure pathways
5 Assessment and measurement endpoints

b Screening Level Ecological Effects Evaluation

1 Preferred toxicity data
2 Dose conversion
3 Uncertainty assessment

c Uncertainty Assessment

Step 2 includes

d Screening level exposure estimates

1 Exposure parameters
2 Uncertainty assessment
3 Screening level risk calculation
4 Scientific/Management decision point (SMDP)
5 Summary

The baseline ecological risk assessment process continues with the following six steps

Step 3 Baseline Risk Assessment Problem Formulation

Step 4 Study Design and DQO Process

Step 5 Verification of Field Sampling Design

Step 6 Site Investigation and Data Analysis

Step 7 Risk Characterization

Step 8 Risk Management

Steps 2 through 6 and 8 are followed by SMDPs

This ecological PRE will include only the screening steps (Steps 1 and 2)

Step 1 Part I Screening level problem formulation

For the screening level problem formulation the Navy will refine the Site CEM based on the following

Environmental setting and contaminants known or suspected to exist at the Site

Contaminant fate and transport mechanisms that might exist at the Site

- The mechanisms of ecotoxicity associated with contaminants and likely categories of receptors that could be affected

What complete exposure pathways might exist at the Site

Selection of endpoints to screen for ecological risk

2 1 Environmental Setting and Site Contaminants

Data will be gathered reviewed and summarized to provide a basis for scoping additional response action at the Site An extensive literature review will identify existing information about sediment conditions biota and fisheries contaminant sources and location magnitude and duration of contamination In addition a search will be conducted for information that is indirectly relevant to the ERA at the Apra Heights area, in particular toxicity data for species that are local or closely related to local species and ecological information on biological assemblages or species important to Guam terrestrial ecosystems Information sources include the Navy the Army Corps of Engineers Guam EPA the University of Guam USEPA USFWS Guam Division of Aquatic and Wildlife Resources and other consultants

The following information is needed to describe the environmental setting

Nature and sources of contamination

- Nature and condition of the biota and fisheries
- Nature and condition of endangered species
- Physical and chemical characteristics of abiotic media in the region
- Previously recorded environmental problems (e g observed bioaccumulation or toxicity)

Climatologic hydrologic physiographic and geohydrologic features that could create contaminant pathways to put the biota in contact with contaminants

Current and projected (future) land use at the Site

Food web relationships

Distinct onsite and offsite habitats that are potentially impacted

This information will be derived from a site reconnaissance and a literature review

2 2 Initial Site Field Survey

A field survey was conducted on November 17 and 18 1997 to gather the data necessary to determine whether or not a problem exists on the Site and identify possible exposure pathways The specific objectives of the field survey were

to characterize the Site and its surroundings in terms of habitats and current and future land use

to look for obvious signs of contamination such as discolored soil bare soil or dead vegetation within an area of thriving vegetation etc which may indicate exposure to contamination or other stressor

to identify ecological receptors on or near the Site

to analyze exposure pathways (including food web relationships) and

to collect the site specific information needed to develop a CEM of the Site

A delineation of on site wetlands was also completed during November 1998 This work identified wetland habitat on the lower parts of the Site and established the jurisdictional boundaries The delineation has been reviewed and approved by USACE and Guam EPA Any investigative or remedial activities that may impact the wetlands will need to be coordinated with the local COE district engineer

2 3 Review of Existing Background Information

Problem formulation synthesizes the scientific data, scientific needs policy and regulatory issues and site specific factors to determine if stressors receptors and exposure pathways exist at a site and to define the objectives and scope of future ecological assessment work The following elements are the specific components required for problem formulation

1 Site Description Description of existing Site conditions

2 Potential Stressors Potential stressors present at the Site will be identified and described Generally at hazardous waste sites the stressors are chemical contaminants

3 Contaminant Fate and Transport Physicochemical properties of potential Site chemical contaminants will be reviewed in light of their tendencies to move through Site media Potential for biotransformation and biodegradation of potential Site contaminants will also be reviewed

4 Ecological Receptors Receptors potentially at risk will be identified These may include species habitat, system functions or other natural resource values

5 Complete Exposure Pathways The routes along which contaminants can move from a point of release through various media to locations where exposure may occur All data and

information developed up to this point of the PRE are used to refine the CEM that integrates information on stressors receptors and pathways This model will indicate the relationships among the relevant physical chemical and biological features of the Site and the associated systems

6 Assessment and Measurement Endpoints Explicit expressions of the environmental characteristics or values that are to be protected and that will be considered within the scope of the ecological risk assessment will be identified Well crafted assessment endpoints establish a clear logical connection between regulatory goals for a site and the objectives of the ecological risk assessment The following four criteria should be considered when establishing assessment endpoints

policy goals

- societal values
- ecological relevance
- susceptibility to the hazardous substances

From the standpoint of general acceptance effects on economically or socially valued populations such as trees fish birds or mammals are the most understandable If species not so valued are particularly susceptible then their link to valued species (such as threatened and endangered species) or other valued environmental attributes (such as aesthetics) will be explicitly described Each assessment endpoint is related to a measurement endpoint in some cases these endpoints may be the same

Although an assessment endpoint may apply to a number of sites it should nonetheless be specific and focused rather than broad and all inclusive The general form of such an endpoint is Protection of {specific valued ecological receptor} from {specific effect} due to the presence of {specific contaminant of potential ecological concern [CPEC]} Examples of assessment endpoints are

no adverse effects on reproduction in higher trophic level wildlife particularly special status birds due to the presence of Site related contaminants

protection of insectivorous birds from egg shell thinning that would result in reduced reproductive success due to the presence of Site related contaminants

Measurement endpoints are quantitative expressions of an observed or measured response in receptors (related to assessment endpoints) exposed to chemical hazardous substances Measurable and/or predictable responses that could indicate the actuality of and/or potential for adverse impacts could include but are not necessarily limited to

mortality survival (acute toxicity)

- reproductive success fecundity growth (chronic toxicity)
- abundance or occurrence
- yield production, or growth (for plants)
- yield, production or growth (for invertebrates)

- contaminant tissue concentrations

Measurement endpoints must be readily measurable phenomena and appropriate for the exposure pathways temporal dynamics of exposure and scale of the site being evaluated Endpoints involving measures of reproductive success or other effects that could conceivably impair the maintenance of the population are preferred over other less sensitive and less population oriented endpoints Examples of measurement endpoints are

impairment of reproduction in the Common moorhen

egg shell thinning in the Yellow bittern

- several metrics describing the abundance and trophic structure of the terrestrial macroinvertebrate community

2 4 Abiotic Media Sampling and Analysis

This task is usually performed by other elements of the site investigation team The risk assessor will however ensure that sampling covers areas and media of ecological interest

- Computation of Analyte Environmental Concentration Environmental concentrations of CPECs will be computed on the basis of analytical chemistry data

  CPECs Selection Process CPECs will be selected on the basis of background levels frequency of detection and physicochemical properties of each analyte The risk assessor will consult with the Navy US EPA Region IX, and other regulators to develop a documented approach to CPEC selection

  Select All CPECs Identify site specific CPECs including those of a physical chemical and biological nature and define the relevant characteristics of the appropriate stressors i e type concentration duration frequency timing and scale

Step 1 Part II Screening level Ecological Effects Evaluation

2 5 Preferred Toxicity Data

Toxicity reference values (TRVs) will be developed on the basis of literature data A contaminant specific TRV will be if available the highest no-observed adverse effect level (NOAEL) for individual ecological receptors determined from chronic tests whose endpoints were effects on reproductive success If such a NOAEL is not available for ecological receptors considered in the risk analysis the TRV may be derived from other toxicological endpoints for those receptors or appropriate surrogates for those receptors adjusted with appropriate uncertainty factors to equate to a NOAEL

The TRV will be based to the extent practicable on studies whose routes of exposure and duration of exposure are commensurate with the expected routes and duration of exposure for ecological receptors considered in the risk assessment, or appropriate surrogates for those receptors

2 6 Potential Ecological Responses

Information about toxicological and other adverse effects associated with specific chemical contaminants is usually found during a literature search This research brings together information on

the physicochemical characteristics and toxic mechanism of a chemical contaminant

- toxicological endpoint values (LD_{50} EC_{50} NOEL etc) for Site related chemical contaminants
- the potential for bioconcentration bioaccumulation or biomagnification of chemical contaminants within receptors at the Site (based upon abiotic and biotic conditions and chemical specific data) and
- gaps in the data on the effects of a particular chemical contaminant on given target receptors

Step 1 Summary Memorandum

The results of the Screening Level Problem Formulation step will be summarized in a technical memorandum that the Navy will submit to EPA region IX Guam Division of Aquatic and Wildlife Resources and the USFWS for comments and agreement The following details of the ERA parameters will be included in the Step 1 Summary Memorandum

Selected assessment endpoints

Selected measurement endpoints

Ecological exposure pathways of concern

Ecological CEM

CPECs

Toxicity literature to be used in developing Site specific chemical toxicity values and chemical specific exposure parameters

The memorandum will consist of an abbreviated text presenting and supporting tables summarizing the information above Step 2 will begin after there is agreement among the stake holders on the data in the Step 1 Summary Memo This agreement will prevent the loss of time and money that may result if parameters unacceptable to some of the stakeholders are used to estimate exposure and calculate risk in Step 2

Step 2 Screening level Exposure Estimate and Risk Calculation

This step includes estimating exposure levels and screening for ecological risks as the last two phases of the screening level ecological risk assessment The process concludes with a with a scientific/management decision point (SMDP) at which it is determined that (1) ecological threats are negligible (2) the ecological risk assessment should continue to determine whether a risk exists (3) there is a potential for adverse ecological effects and a more detailed ecological risk assessment, incorporating more site specific information is needed

2 7 EXPOSURE ANALYSIS

The tasks to be performed during the exposure analysis are as follows

Measure or predict spatial and temporal distribution of the relevant stressors including uncertainties

Estimate site specific and species specific exposure parameters including uncertainties

Integrate fate transport, and bioavailability of contaminants with spatial and temporal distribution patterns and other exposure parameters of the biota at the site to provide an estimate of exposure

Include any chemical (e g bioaccumulation) biochemical or physiological evidence available that indicates previous exposure at the study site and

Develop exposure point values (EPVs) or profiles for target receptors based on estimated or measured tissue concentrations or applied daily doses

The distribution and patterns of change of physical chemical (CPECs) and biological stressors that have been identified as important during planning of the ecological PRE will be qualitatively or semi quantitatively described Only complete exposure pathways will be evluated

2 8 UNCERTAINTY ASSESSMENT

An uncertainty analysis in the ecological PRE involves the following tasks

Summarize assumptions and evaluate their validity Evaluate the strengths and weaknesses of the analyses

Quantify to the extent possible the uncertainties associated with each identified risk

Evaluate the validity of risk calculations on the basis of life stage season and types of organisms examined etc

2 9 SCREENING LEVEL RISK CALCULATION

The objective of the screening level risk calculation is to determine the relationships between the analysis and measurement endpoints and the stressors by (a) identifying the mechanism for effects (responses or symptoms) that pertain to the stressors and (b) developing stressor response profiles Toxicity literature will be reviewed to determine the types of effects that could be expected in the analysis endpoints and other functionally important biota following exposure to CPECs

For the purposes of this ecological PRE only risk assessors will use a standard quotient methodology which compares concentrations of contaminants estimated or measured in receptors (EPVs) with data in the literature on levels of exposure observed to have caused no chronic or acute toxicity in other areas species or media (TRVs) Exposure point values are divided by appropriate TRVs to calculate toxicity quotients (TQs) TQ values are then used as indicators of but not as a measure of potential risk from a contaminant TQ values that exceed 1 indicate a potential for risk to an ecological receptor but the risk must be interpreted considering the uncertainties in the calculation of the TQ

Using the quantitative risk estimates interpreted in light of the uncertainty analysis risk assessors will assess the potential for CPECs to cause adverse effects in receptors related to assessment endpoints The ecological PRE leads to one of two outcomes (1) dismissal of a site from further consideration if there are no reasons to suspect that it presents a risk to the biota or natural resources (No Further Response Action Planned [NFRAP] or (2) identification of concerns that require further investigation and performance of an ecological BRA (Steps 3 through 8) as part of either the removal action or the RI processes

3 REFERENCES

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_____ 1996b USEPA Region IX Internal Memo Regarding Adult Lead Cleanup Goal from Daniel Stralka to Lewis Mitani August 8

_____ 1996c Recommendations of the Technical Review Workgroup for Lead for a Interim Approach to Assuming Risks Associated with Adult Exposures to Lead in Soil Technical Review Workgroup for Lead December

_____ 1997 Ecological Risk Assessment Guidance for Superfund Process for Designing and Conducting Ecological Risk Assessments EPA 540 R 97 006 June

4425-165644

Camp Covington

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco CA 94105

April 17 1998

MEMORANDUM

SUBJECT Draft Work Plan and Sampling and Analysis Plan for a Site Investigation of an Abandoned Pipeline Site Tenjo Vista Guam Mariana Islands Document Control Number [DCN] not available) BDGU001W98USF1 + BDGU003S98USF1

FROM Joe Eidelberg Chemist
Quality Assurance Program PMD-3

THROUGH Vance S Fong P E Manager
Quality Assurance Program PMD-3

TO Mike Wolfram Remedial Project Manager
Army & Pacific Islands Section SFD-8-3

Draft Work Plan (WP) and Sampling and Analysis Plan (SAP) for a site inspection (SI) of an abandoned pipeline site prepared by Earth Tech Inc for the Department of the Navy and dated March 1998 were reviewed The SAP is composed of two sections a field sampling plan (FSP) and a quality assurance project plan (QAPP) The review was based on guidance provided in Preparation of a U S EPA Region 9 Field Sampling Plan for Private and State-Lead Superfund Projects (August 1993 9QA-06-93) EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations (EPA QA/R-5) and Guidance for the Data Quality Objectives Process (EPA QA/G-4)

The WP and SAP include most of the required elements for field sampling However some concerns have been noted during the review For example location maps do not identify all sampling locations tolerable limits on decision error have not been specified in the discussion on data quality objective (DQOs) and standard operating procedures (SOPs) are referenced for routine procedures but are not included with the documents The document is not consistent on how the laboratory should use project quality control (QC) criteria In addition no quality assurance manager (QAM) is identified for the project

The QA Program believes that the WP and SAP should address the following concerns prior to receiving EPA concurrence

Major Concerns

1 [**WP** Sections 4 Site Inspection Rationale 4 1 6 Excavate Trenches and Collect Subsurface Soil Samples Along Pipeline 4 2 6 Step 6 Specify Limits of Detection Error] Section 4 2 6 states that limits of decision error for the project cannot be defined because no previous information is available on contaminant concentration levels at the site Setting quantitative limits of decision error should be part of the planning process and used to aid the decision makers in choosing the number of samples that will need to be collected to meet the project objectives As no further action may be taken following this investigation it is recommended that the WP include quantitative acceptable decision error rates based on the consequences of making an incorrect decision Further limited information is provided in the WP on the rationale for the chosen number of samples It is suggested the WP discuss how the number of samples chosen will provide an acceptable level of confidence in the results

2A [**SAP** Sections 2 1 3 Field Sampling Program 2 1 10 Survey of Site and Sampling Locations Figure 2-1 Pipeline and Activity Location Map Table 3-1 Summary of Sample Collection Program **WP** Sections 4 1 Technical Approach 4 1 5 Collect Surface Soil Samples in Low-Lying Areas Figure 4-1 Pipeline and Activity Location Map] Sections 2 1 3 of the SAP and 4 1 of the WP state that the proposed sampling locations are identified in Figures 2-1 and 4-1 respectively Figures 2-1 (SAP) and 4-1 (WP) are the same figure Only the monitoring wells (groundwater sampling) and two of twelve trenches (sub-surface soil sampling) are indicated on the figures The location of the proposed five surface soil samples and the other ten trenches (Table 3-1) are not identified It is recommended that all sampling locations be identified on the figure It is further recommended that all sampling points should be identified on a location map of the area (such as Figure 1-1 of the SAP) rather than a schematic map so that they will be easy to locate by field personnel

2B Section 2 1 10 of the SAP describes how the sampling locations will be documented after all sampling is complete However Region 9 also requires that a FSP describe how sampling points will be selected in the field For example in the absence of a location map how will the field crew locate the proposed sampling points It is recommended that this information be included in the SAP

3 [**SAP** Section 3 3 2 6 Laboratory Quality Control Table 3-4 Project Quality Control Criteria] Section 3 3 2 6 of the SAP states that in the absence of laboratory specific

acceptance criteria the QC criteria in Table 3-4 will be used to validate data If the QC criteria in Table 3-4 are the specific QC criteria for the project then the laboratory chosen to perform the analyses should be able to achieve these limits (or more stringent if the laboratory routinely uses tighter limits) Similarly with Sections 3 4 2 3 (Matrix Spikes) and 3 4 2 4 (Duplicates) the laboratory chosen should be able to achieve project QC criteria described in Table 3-4 (Note Section 3 3 2 2 Target Detection Limits states the laboratory will be required to meet minimum detection limits)

Concerns

1 [**WP** Section 4 1 6 Excavate Trenches and Collect Subsurface Soil Samples Along Pipeline] Section 4 1 6 of the WP states grab samples will be collected from each trench but does not state how many will be collected for compositing It is recommended the plan indicate how many grab samples will be composited for each trench sample

2A [**SAP** Section 2 1 Description of Field Sampling and Testing Program] Section 2 1 of the SAP describes the proposed field sampling for the SI In many cases however specific step-by-step procedures for sample collection are not provided rather SOPs are referenced A field sample plan (FSP) should provide step- by-step procedures for samplers to follow or alternatively any appropriate SOPs to be used must be included with the plan

2B It should also be noted that Section 4 1 8 of the WP (Install Develop and Sample Groundwater Monitoring Wells) indicates that details on well construction and materials and groundwater sampling are included in the SAP Once again SOPs are referenced in the SAP but specific procedures are not included

2C Region 9 requires that when wells are being constructed for sample collection a description of design and construction details should be included In addition a table of well specifications such as well depths and casing diameters should be included in a FSP It is recommended that this information be included in the SAP

3 [**SAP** Section 2 3 2 Contractor Sample ID Number Table 2-5 QC Identifiers] Section 2 3 2 describes how samples will be labeled in the field It is suggested however that the QC identifiers described in Table 2-5 may not be blind to a laboratory if submitted for example as D for duplicate as noted in Table 2-5

4A [**SAP** Section 3 1 2 Project Organization] Section 3 1 2 of the SAP includes a table listing the project members No QAM is included in the table It is recommended the SAP include information on the project s QAM by identifying the QAM their level of authority lines of communication with management and independence from the entities producing data It is further recommended that an organization chart depicting all project personnel be included

4B It appears from the organization provided that the list includes Earth Tech Inc personnel only It is therefore recommended that a QAM who is a government employee (Navy) also be identified in the SAP

5 [**SAP** Sections 3 3 2 Laboratory Measurements 3 3 2 4 Calibration Procedures 3 3 2 5 Preventative Maintenance 3 3 2 6 Laboratory Quality Control 3 7 1 Laboratory System Audits] Limited information is provided on the proposed laboratory which will perform the analysis In fact it is unclear if more than one laboratory will be involved because Section 3 3 2 4 opens with the laboratories while Sections 3 3 2 5 and 3 3 2 6 open with the laboratory It is also unclear if a laboratory (or laboratories) has been chosen for the project at the time of writing this SAP Section 3 3 2 indicates a laboratory has not yet been chosen while Sections 3 3 2 5 and 3 7 1 seem to indicate a laboratory has already been selected If a laboratory (or laboratories) has been selected it is suggested it be identified

6 [General] The SAP includes most of the QAPP elements required by EPA QA/R-5 However the following lists some that have not been included

6A Approval sheet including the names titles signatures of appropriate approving officials and their approval dates

6B Distribution list of the individuals and their organizations who will receive the document and

6C The QAPP discusses data deliverables in hard copy and electronic format (Sections 3 4 5 3 6 1 and 3 6 3) However Region 9 also requires that a provision should be made for obtaining gas chromatography (GC) and gas chromatography/mass spectrometry (GC/MS) data on magnetic tape This should be made available to the Department of the Navy and to Region 9 upon request

Comments

1 [General] The pagination is incorrect in both the WP and the SAP text and table of contents

2 [**WP** Section 4 2 4 Step 4 Study Boundaries Table 6-1 Site Inspection Draft Schedule **SAP** Sections 2 1 Description of Field Sampling and Testing 3 5 Data Quality Assessment-Comparability] Section 4 2 4 and Table 6-1 of the WP and Section 2 1 of the SAP indicate that multiple sampling is not proposed for the project While Section 3 5 of the SAP speaks of both sampling events Presumably this is an error and should be corrected

3 [**SAP** Sections 2 1 11 Equipment and Personnel Decontamination 4 References] Section 2 1 11 cites a Health and Safety Management Plan It is suggested this be referenced in Section 4

4 [**SAP** Table 3-4 Quality Control Criteria] The units for volatile organic compounds (VOCs) have been omitted from the table

Questions or comments regarding this review should be referred to Joe Eidelberg EPA at (415) 744-1527 Technical assistance for this review was provided by Deirdre O Leary Lockheed Martin Environmental Services Assistance Team (ESAT) Contract No 68D60005 Work Assignment (WA) No 09-98-2-5 Technical Direction Form (TDF) No 9825007

4425-165644

June 4 1998

Camp Covington

MEMORANDUM

SUBJECT Draft Work Plan and Draft Sampling and Analysis Plan for the Abbreviated Remedial Investigation New Apra Heights Disposal Area COMNAVMARIANAS Guam (EPA QA Program Document Control Numbers [DCNs] BDGU006W98VSF1 and BDGU007S98VSF1)

FROM Joe Eidelberg Chemist
Quality Assurance Program PMD-3

THROUGH Vance S Fong P E Manager
Quality Assurance Program PMD-3

TO Mike Wolfram Remedial Project Manager
Army and Pacific Islands Section SFD-8-3

The subject draft work plan (WP) and draft sampling and analysis plan (SAP) prepared for the Department of the Navy by Earth Tech Inc and dated April 1998 were reviewed The review was based on guidance provided in EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations August 1994 (EPA QA/R-5) Preparation of a U S EPA Region 9 Field Sampling Plan for Private and State-Lead Superfund Projects August 1993 (9QA-06-93) and Guidance for the Data Quality Objectives Process September 1994 (EPA QA/G-4)

The WP provides information regarding project history site description site evaluation data quality objectives (DQOs) remedial investigation (RI) tasks project schedule and an appendix which addresses human health and ecological preliminary risk assessment The SAP consists of two parts Part 1 is a field sampling plan (FSP) and Part 2 is a quality assurance project plan (QAPP) The SAP includes most of the FSP and QAPP elements required by Regional and Agency guidance However some elements require additional information and clarification while some elements have not been addressed These issues and some discrepancies are identified in the following itemized concerns

The subject SAP and WP cannot be approved by the Region 9 QA Program until the following concerns are addressed

Major Concerns

1 [FSP Section 2 3 2 Passive Soil Gas Survey Procedure] Section 2 3 2 states that soil gas probes will be installed and operated according to the manufacturer s recommendations and that the supplier of the gas probes will assist with the documentation needed for shipping the probes off-island and will analyze the soil gas probes The

supplier should be identified and the documentation described The discussion concerning soil gas probes in the SAP should be expanded to describe the collection and analysis of soil gas samples the principle behind the probes description of the technique sample packaging requirements holding times detection limits and quality control (QC) requirements and criteria If the soil gas samples will be sent to a different laboratory than the soil samples this should be discussed in the plan The laboratory QA plan should be provided for review

2 [FSP Section 2 5 2 Procedure Surface Soil Sampling Table 5-1 Containers and Preservatives QAPP Table 2-2 Requirements for Sample Preservation] Table 5-1 of the FSP and Table 2-2 of the QAPP indicate that glass jars will be utilized for soil samples collected for VOCs analysis while Section 2 5 2 of the FSP states that liners from core barrels will be used as sample containers It is recommended that the liners from core barrels be used as sample containers to avoid the potential loss of VOCs while transferring the sample to a glass jar This discrepancy must be addressed before sampling activities begin

3 [QAPP Section 1 3 Project Organization Figure 1-2 Project Organization Chart] The organization chart does not include any QA positions The chart should depict the QA manager and illustrate the QA manager s relationships with other project personnel The organization chart must also identify the Navy QA manager Section 1 3 should be revised and expanded to include descriptions of project and oversight personnel responsibilities Section 1 3 mentions a QA/QC reviewer however this position is not identified in the organization chart

4A [QAPP Table 3-1 Project Quality Control Criteria] Table 3-1 does not specify precision or accuracy criteria for many analytes A footnote for the missing criteria states standard not established The QAPP is the appropriate document to establish these limits based on project needs

4B Table 3-1 indicates that soil gas will be analyzed by SW846 8260 and 8270 not 8021 as indicated in other locations of the WP and SAP It is not clear whether the detection limits specified for soil gas volatile compounds are for method 8021 or 8260 This issue must be resolved

Concerns

1 [General] The SAP and WP reference standard operating procedures (SOPs) for a number of sampling activities

Since complete descriptions for a number of tasks (e g soil gas sampling) are provided in SOPs with little or no detailed information provided in the SAP the SOPs must be included with the final revision of the SAP

2A [WP Table 3-1 Chemicals of Potential Concern] Table 3-1 lists concentration ranges of chemicals of potential concern (COPCs) Results for volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) are presented in ug/L units appropriate to liquid samples Results for total petroleum hydrocarbons (TPH) metals pesticides and explosives are presented in mg/kg or ug/kg This inconsistency should be corrected or explained

2B A footnote to Table 3-1 indicates that the results for VOCs and SVOCs are to be considered estimates because the reported value was less than the contract required detection limit (CRDL) Note that these concentrations are as high as 16 000 ug/L for VOCs and 270 000 ug/L for SVOCs It is recommended that the table indicate whether the results are total VOCs and SVOCs (summed) or provide the results for individual compounds

3 [FSP Table 3-1 Analytical Methods] Table 3-1 should specify whether soil samples will be analyzed for extractable or purgeable total petroleum hydrocarbons (TPH)

4 [FSP Section 5 3 5 Health and Safety] Section 5 3 5 states that for complete details concerning health and safety the Health and Safety Plan (HSP) is provided in an appendix to the SAP The HSP is not attached to SAP and is not identified in the table of contents The HSP must be included with the SAP in the field

5 [QAPP Section 2 2 1 Field Replicates FSP Table 3-3 Sampling and Analysis Plan Summary Table 4-2 QC Designator Types] Although Section 2 2 1 of the QAPP states that replicate samples collected for volatiles will not be homogenized it is not clear from Tables 3-3 and 4-2 of the FSP that this is the case Table 3-3 of the FSP indicates that field replicates will be collected for VOC samples and Table 4-2 defines a *replicate* as an homogenized sample (as opposed to *duplicate* which is defined as a collocated sample in Table 4-2) The FSP tables should be revised to indicate that replicate (or duplicate) samples collected for VOC analysis will not be homogenized

6 [QAPP Section 5 Data Quality Assessment] The QAPP should describe how the results will be reconciled with the results of the DQO process established in the WP

7 [QAPP Section 6 Data Management] Section 6 states the required turn around time for data packages It is not clear whether this information applies to soil gas analyses It is recommended that Section 6 be revised to address soil gas analyses

8A [QAPP Section 6 1 Receipt of Deliverables] Section 6 1 refers to a project chemist The affiliation of this position e g whether this is a laboratory or Earth Tech position is not clear A project chemist is not identified in the organization chart or related text

8B Section 6 1 should include a specification that the gas chromatography/mass spectrometry (GC/MS) tapes will be submitted with the project data and will be available to EPA upon request

9 [QAPP Section 7 Audits and Corrective Actions FSP Section 2 9 Site-Specific Field QA/QC Requirements Table 4-2 QC Designator Types] Section 7 of the QAPP should be revised to describe the use of double-blind performance evaluation (PE) samples for laboratory evaluation Note that Table 4-2 of the FSP specifies the QC designator X for PE samples and that Section 2 9 of the FSP cites the QAPP for details of QA/QC requirements

10 [QAPP General] The following elements are required by the current guidance document QA/R-5 According to QA/R-5 if an element is not considered appropriate to the project this should be stated and a reason provided

10A Names titles and signatures of approving officials and approval dates

10B A distribution list of persons and organizations who will receive copies of the approved document

10C Special training requirements/certification The QAPP should indicate whether special training or certification is required to perform tasks required for the project

Questions or comments regarding this review should be referred to Joe Eidelberg EPA QA Program at (415) 744-1527 Technical assistance for this review was provided by Doug Lindelof Lockheed-Martin Environmental Services Assistance Team (ESAT) Contract No 68D60005 Work Assignment (WA) No 9-98-2-5 Technical Direction Form (TDF) No 9825019